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THE ELEOCHARIS OBTUSA-OVATA COMPLEX

Henry K. Svenson

Eleocharis ovata has been known as an element of the Eurasian flora, and its recognition as an inhabitant of North America distinct from the ubiquitous *E. obtusa* dates from an account of the group by M. L. Fernald in 1899. His treatment, published in the Proceedings of the American Academy, was initiated by an attempt to identify more clearly the dwarf specimens of the *E. obtusa* group (Gray Exs. no. 138) collected in Purgatory Swamp at Norwood, Massachusetts, and previously determined as *E. obtusa*, *E. ovata*, *E. palustris*, *E. olivacea*, and *E. diandra*. Such differences of opinion not only show the close outward similarity of dwarfed specimens of the genus, but the difficulty encountered when plants have become established in an unusual environment, and have been so contrary as to develop stolons. These specimens finally came to rest under *E. obtusa* var. *jejuna* Fernald, a dwarf form described from North Berwick, Maine, the Purgatory specimens noted as having "spikes more elongated and tubercle narrower than in the extreme form." In Rhodora **31:** 216. 1929, I observed that var. *jejuna* "seems to be an ecological phase which occurs when the plant is growing in muddy inundated places," and it was especially marked in dwarf plants forming turf in a mill pond at Weymouth, Massachusetts (coll. *Fernald & Svenson* in 1928), where there was a succession of flooded and dry conditions. In these specimens the small strongly biconvex achenes had acute greenish tubercles as wide as the achene, and nearly half as high. Let us return to *E. ovata*. This plant is of scattered occurrence in the greater part of central Europe (but apparently not in the British Isles) and extends eastward through Russia to Siberia and the Amur region. It has the outward

appearance of *E. obtusa*, but is inclined to be smaller in stature. The chief difference is in the relative dimensions of the tubercle, ½ to ⅔ as broad as the achene, whereas in *E. obtusa* it is nearly or quite as broad as the achene. *E. ovata* is known from scattered stations in North America from Newfoundland to Washington, usually on lake margins as a sprawling plant with purplish scales, with its greatest frequency in Maine, Vermont, and Minnesota. Within *E. ovata* I included (Rhodora **41:** 43. 1939) *E. diandra*, described from sand-bars of the Connecticut River, and known from several river banks of the northeastern states and differing from *E. ovata* in the depressed tubercle, and reduced bristles. Its greatest concentration is in estuaries, where plants are subjected to alternate flooding and exposure, but it is also known from the sandy eastern margin of Oneida Lake in central New York, where the extensive sand-bars and alternating shallow water provide conditions somewhat similar to those of an estuary.

A recent reexamination by me of the type of *E. Macounii*, known from marshes near Ottawa, makes it clear that this is another of the estuarine modifications of *E. obtusa*, with narrow spikelets in which only a few achenes develop. These vary from biconvex to trigonous, with a tubercle intermediate between *E. obtusa* and *E. ovata*, and with bristles exceeding the achene.

The peculiarity of *Eleocharis* of this group in the Hudson estuary (Rhodora **31:** 211. 1929, and **41:** 43. 1939) has already been mentioned by me in respect to rhizome development and close resemblance to *E. ovata*. Phenomenal variations appeared in collections made by me in September, 1950, at Livingston, Columbia County, New York. The material at the upper level is normal *E. obtusa* (*Svenson* no. 13050A) 2–3 dm. high, with rounded spikelets and achenes 1.25 mm. long and 0.75 mm. wide, including the tubercle which is as wide as the achene. At the intermediate stage of submergence the plants (*E. diandra* 13050D) are smaller (10–15 cm. high), the culms slender, spikelets frequently lanceolate and thin-scaled, achenes 1.2 mm. long and 0.7 mm. broad, the tubercle half as broad as the achene, and most frequently acute, and bristles half as long as the achene or less. At the lowest level, plants (*E. diandra* 13050C) are re-

duced mostly to 5–6 cm., and the spikelets sometimes nearly linear, the achenes as above but bristles usually lacking. Thus there is a series reduced from *E. obtusa* accompanying the various levels. The plants with lanceolate spikelets greatly resemble those of *E. lanceolata* of Arkansas and northern Texas, but are probably not closely related and represent parallel evolution. This situation in the estuaries suggests that Eurasian *E. ovata*, with its narrowed tubercles, has been derived from North American stock, perhaps as the result of changed environmental conditions.

The *obtusa-ovata* group has tenuous limits for determination of species. In fact, all have been considered at some time as variants of the same specific complex, an opinion which may be close to reality. I have seen a few well-developed trigonous achenes in dwarf plants of *E. obtusa* (coll. *B. F. Bush*, Campbell, Missouri, Oct. 26, 1892), which may give a clue to ancestral forms. The tubercle is trigonous with a trilobed base, decurrent on the angles of the achene, much in the manner of *E. pachystyla* of the West Indies, Venezuela, and Colombia, and *E. viridans* of Uruguay. Probably *E. obtusa* comes from the perennial *E. pachystyla*, which it resembles in outward appearance, and the closest derivative of the complex is probably *E. Engelmanni* of the Middle Atlantic and Central States (see map 45, Rhodora **41:** 75. 1939), with a low and frequently somewhat trigonous style-base tending to be decurrent on the angles. *E. monticola* of scattered distribution in the Western States, should be included (cf. Rhodora **31:** 209. 1929) as a variety of *E. Engelmanni*. In the ubiquitous *E. obtusa*, stolon-like branches are occasionally produced toward the end of the growing season, and this is a common occurrence in var. *ellipsoidalis* of quagmires of the Atlantic Coastal plain. A similar condition has already been mentioned as occurring in estuary plants. Throughout its range *E. obtusa* is extremely variable in the size of plants and size and shape of spikelets, these becoming very large in the var. *gigantea* of the western coast, and also in the related *E. Engelmanni* var. *robusta* of southern Missouri. In *E. obtusa* var. *Peasei*, of pond shores in northern New England and Quebec, the achene is without bristles.

In the seventh edition of Gray's Manual (p. 180), the various species are keyed out as follows:

Tubercle less than two-thirds as broad as the achene.
Tubercle depressed turban-shaped, broader than high; bristles wanting or rudimentary ..... *E. diandra.*
Tubercle deltoid-conic, higher than broad; bristles much exceeding the achene ..... *E. ovata.*
Tubercle nearly or quite as broad as the achene.
Tubercle depressed-conic, concaved toward the tip, one-third as high as the achene; bristles much exceeding the achene ..... *E. obtusa.*
Tubercle flat-deltoid, with straight sides, one-fourth as high as the achene; bristles scarcely or not at all exceeding the achene ..... *E. Engelmanni.*

Species in this group have been differentiated on the somewhat arbitrary basis of style-base dimensions in relation to the size of the achene, as may be noted in the cited key to species. Skottsberg (Acta Hort. Gotoburg. **15:** 304–5, figs. 137–147. 1944), in a discourse on Hawaiian material, believes that the difference in width of tubercle (style-base) between *E. obtusa* and *E. ovata* is not so pronounced, and that difference in size of achenes is more decisive. He gives the following figures: for *obtusa* 1.4–1.7 (commonly 1.5) x 0.8–0.9 mm.; for *ovata* 0.9–1.2 (commonly 1–1.1) x 0.6–0.7 (rarely over 0.65) mm.

Though the great mass of specimens of the *E. obtusa* group can readily be determined without trouble, difficulties arise where the variations come in contact, or occur in unusual environments. These annual species of *Eleocharis* can be grown

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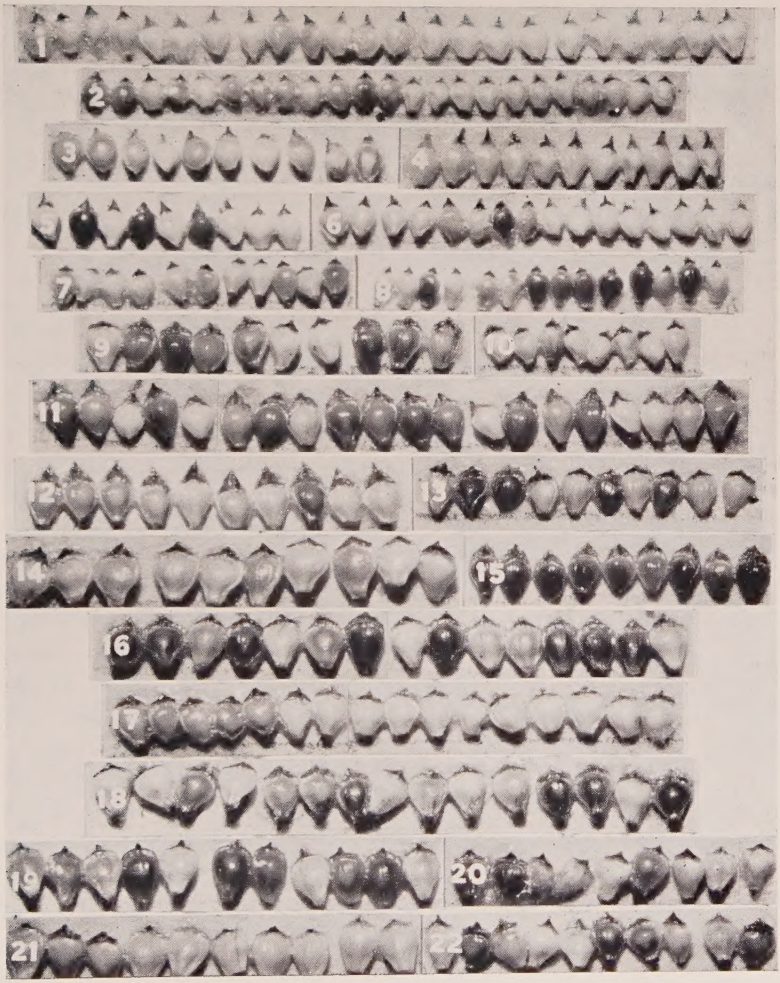
Explanation of Plate—Fig. 1, Eleocharis ovata *Lakela* 1731, Duluth, Minnesota; 2, E. ovata *Vailleau* 330, France; 3, E. obtusa var. jejuna *Gray Exs.* 438, Weymouth, Massachusetts; 4, E. obtusa *Lakela* 89, Anoka Co., Minnesota, normal E. obtusa; 5, E. ovata *Fernald & Wiegand* 4696, Rushy Pond, Newfoundland, spikelets rounded to elongate; 6, E. ovata *Ziegler* in 1907, Saxony; 7, E. diandra *Bissell*, East Windsor, Connecticut in 1899; 8, E. diandra *Haberer* 1356, Oneida Lake, New York; 9, E. obtusa *Cooper* 89, Anoka County, Minnesota, typical *E. obtusa;* 10, E. ovata *Suksdorf* 2328, Clarke Co., Washington, typical *E. ovata;* 11, E. obtusa *Hermann* 9949, Bowie, Maryland, typical *E. obtusa;* 12, E. obtusa var. gigantea *Macoun* in 1893, New Westminister, British Columbia; 13, E. obtusa *Bickell* 942, Valley Stream, Long Island, New York, small spikelets; 14, E. Engelmanni var. robusta *Demaree* 17714, Logan Co., Arkansas; 15, E. obtusa var. ellipsoidalis *Fernald & Long* 7331, Caprom, Virginia; 16, E. Engelmanni *Steyermark* 22780, Taney Co., Missouri, unusually high tubercles; 17, E. obtusa *Gray Exs.* 138, Norwood, Massachusetts; 18, E. Engelmanni *Metcalf* 589, Socorro Co., New Mexico; 19, E. Engelmanni *Svenson* in 1916, Birch Pond, Saugus, Massachusetts; 20, E. Engelmanni *Kildahl*, Maza, North Dakota; 21, E. Engelmanni *Shreve* 1587, Dorchester Co., Maryland; 22, E. Engelmanni *Rosendahl & Johnson*, Anoka Co., Minnesota in 1917.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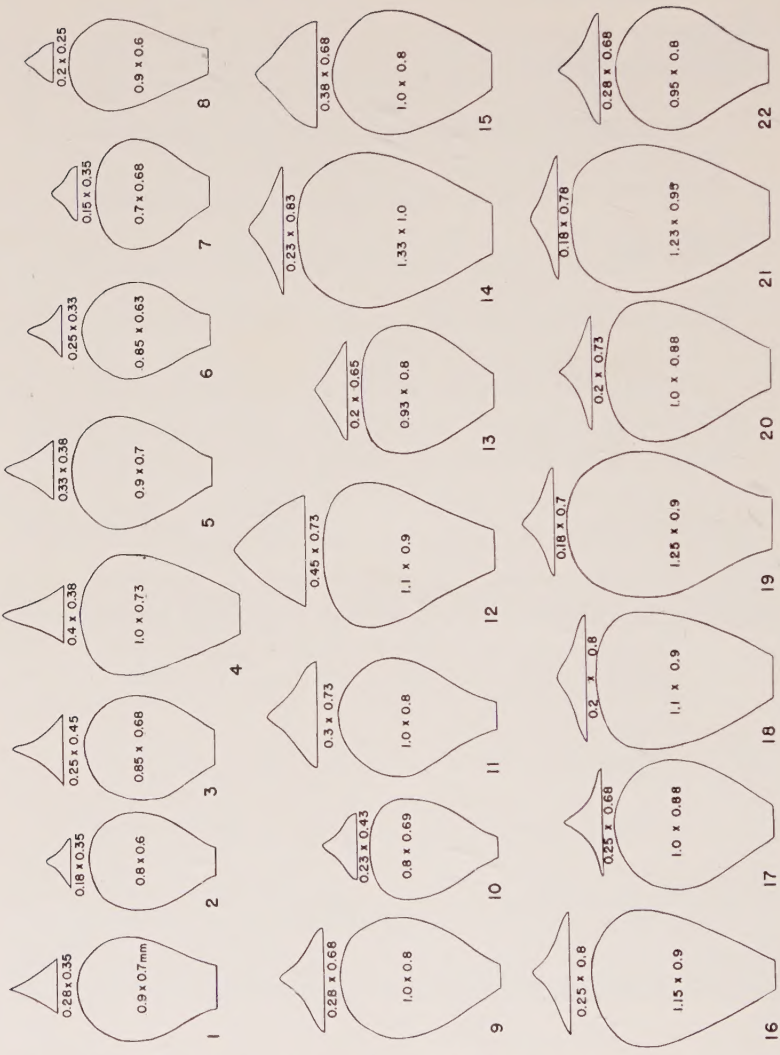

Outlines of achene-body and tubercle representing average dimensions of individual collections shown in Plate 1188.

fairly rapidly in a greenhouse, and experimental and cytological work might perhaps give a clearer understanding of material which is at the border lines. The accompanying photograph was prepared from specimens mounted on a fragment of bristol board, with Lepage's glue as the adhesive. Fassett's use of cellulose acetate (cf. RHODORA **53:** 141. 1951) in a treatment of seeds of *Callitriche*, might be more advantageous, but at best the manipulation of such small structures is not easy.

Where bristles occurred (as in specimens of *E. obtusa* and *ovata*), obscuring the achene-body and tubercle, they were removed together with a minute portion of the base of the achene, by means of fine scissors. I do not think the amount removed from the achene was sufficient to influence the measurements. The slide was photographed and enlarged about 62 ×, and by using a half-millimeter grid-micrometer eyepiece or even a half-millimeter metal rule under a binocular, it was comparatively easy to measure the dimensions of the individual achenes. A few aberrant or poorly mounted achenes were discarded. By adding the measurements and dividing by the number of achenes for each collection, the mean dimensions for tubercle and achene-body were readily calculated. Such photographic enlargements provide a method by which the average or mean dimensions of minute structures can be determined in a manner somewhat similar to the use of "mass collections." Furthermore, the photographic enlargement itself remains as a voucher for the material from which the statistics have been derived. From the mean dimensions of tubercle and achene-body of the individual collections represented in the photograph, outlines of the achenes were drawn up on graph paper and then traced to provide the drawings in the accompanying chart, (Plate 1189) upon which the actual measurements in millimeters are recorded. From these figures the relative achene proportion can be accurately calculated, an analysis of which is provided in the accompanying table.

The average figures for typical *E. obtusa* in the table (achene-body plus tubercle height) are 1.26 x 0.8 (compared with 1.5 x 0.8–0.9 given by Skottsberg); for var. *jejuna*, 1.1 x 0.7 mm.; for var. *gigantea*, 1.6 x 0.9 mm. Most of the Hawaiian material of *E. obtusa* is referable to var. *gigantea*, whereas the achenes of

E. obtusa of eastern United States tend to run smaller. *E. diandra* has achenes approximately the same size as those of *E. ovata*. The ratio of achene width to tubercle width (cf. accompanying chart) is 1.8 x (i. e. nearly twice) in *E. ovata* and 1.3 x (a little wider) in *E. obtusa*, while the achene body in *E. diandra* is 2.1 x (twice as wide). The ratio of height to width of the

	Body	Tubercle		Ratio
	Average (*Ht.*) (*Width*)	(*Ht.*) (*Width*)	(*Ratio*)	*Body Width to Tubercle Width*
E. ovata figs. 1, 2, 5, 6, 10	0.85 x 0.66 mm.	0.25 x 0.36 mm.	1.4	1.8
E. obtusa figs. 4, 9, 11, 13, 17	0.98 x 0.8	0.28 x 0.62	2.2	1.3
E. diandra figs. 7, 8	0.8 x 0.63	0.18 x 0.3	1.7	2.1
E. Engel. figs. 16, 18–22	1.1 x 0.9	0.21 x 0.74	3.5	1.2
E. Engel. var. *robusta* fig. 14	1.33 x 1.0	0.23 x 0.83	3.7	1.2
E. obtusa var. *jejuna* fig. 3	0.85 x 0.67	0.25 x 0.45	1.8	1.5
E. obtusa var. *ellips.* fig. 15	1.0 x 0.8	0.39 x 0.68	1.8	1.2
E. obtusa var. *gigantea* fig. 12	1.1 x 0.9	0.45 x 0.73	1.6	1.2

tubercle of *E. ovata* as represented in nos. 1, 2, 5, 6, and 10 respectively is as follows: 0.28 x 0.35; 0.18 x 0.35; 0.33 x 0.38; 0.25 x 0.33; 0.23 x 0.43. Of these no. 2 and no. 6 are European and they show, as do the American collections which are treated here, that the tubercle really averages wider than high, the ratio being 1.4 ×.

A difficulty in the species problem rests upon the fact that the mind occasionally recognizes the two ends of a continuous series as representing independent species, and tends in such instances to ignore intermediates. Such may be the case between the red and black spruces, *Picea rubens* and *P. mariana*, and every botanist will at once recall other similar situations. Perhaps the same situation exists in respect to some of the complex variations in the difficult *Eleocharis ovata* group, and this treatment should at least provide a background for closer observation of the component elements in critical areas. The American Musuem of Natural History, New York.

THE OLD MASSACHUSETTS HERBARIUM

R. E. Torrey and E. L. Davis

In the attic of Clark Hall at the University of Massachusetts there has long been stored an old herbarium which was sent to us from the State House in Boston "many years ago." In 1911, when the senior author was an undergraduate in botany at the College, Dr. George E. Stone, then department head, directed him to go through the collection and to insert loose labels, bringing the names into accord with those of the 7th edition of Gray's Manual. In 1914 Mr. F. G. Floyd visited the college, made a hasty examination of the collection, and identified it as the basis for Item No. 126 in Miss Day's List of Local Floras of New England. This particular item refers to a list of plants cited in the 7th Annual Report of the Massachusetts Board of Agriculture for 1859, printed in Boston in 1860. On page 139, under the heading of "Secretary's Report" (the secretary being C. L. Flint) occurs the following paragraph:

> "Constant efforts have been made to build up the State Cabinet, the object being to make a collection illustrating all branches of the natural history and the agriculture of the Commonwealth, and many valuable additions have been made to it during the past year, the aggregate number of specimens exceeding three thousand.
>
> "It is gratifying to be able to state that the interest in the cabinet has largely increased as its practical value has become more and more manifest. A catalogue of the plants will be found in the Appendix. In other departments the additions, though not so extensive, are nevertheless valuable and interesting."

The "Appendix" to which reference is made occurs on pages III–XII of the same Report; it is headed "Catalogue of Plants," and a preliminary word reads:

> "Most of the plants enumerated in the following list were collected by Dr. Edward Jarvis and Charles Jarvis and deposited in the Cabinet by the former. A portion was collected by Dr. Henry Little of Boston, and presented to the Cabinet by Dr. Charles Pickering. These collections have been examined and arranged by Charles J. Sprague, and owing to the number of duplicate specimens, it has not been thought necessary to catalogue them separately. In addition to the above named collections, many acquisitions have been added during the present year."

Then follows a list of 401 genera and 773 species of vascular plants.

In an article published in Rhodora,[1] Mr. Floyd tells us that the later history of the "Massachusetts Cabinet" had been forgotten until, almost by accident, he learned that the Herbarium had been sent to the Agricultural College in Amherst, where he verified the report by personal inspection. We might mention in passing that the zoological and geological collections appear likewise to have had the same disposal and are now housed in Fernald Hall at the University.

The present State Herbarium, located in Clark Hall, has been expanding in the last decade and just as rapidly as straitened finances make the change possible, is being transferred from old wooden cases to steel ones for safer storage. In the expansion and reorganization, several collections, long stored in the attic for lack of cabinet space, have been incorporated, and the old "Massachusetts Herbarium" has again received attention. Examination showed that some of the specimens were detaching from the sheets, that the writing on the original labels was sometimes faded and close to illegibility, and that specimens had sometimes gotten into wrong folders. Part of the plants are loose in the species folders; others are fastened with strips of gummed paper to a once-folded sheet of primitive-looking paper which is coarse-textured, gray, flexible and deckle-edged. The labels are apparently cut from old letters; they are irregular in shape and wholly inconsistent in size and recorded data. Many bear only the Latin name—rarely the authority is cited, though Linnaeus and Michaux sometimes appear, and we now realize that *Ph.* means Pursh, and *Bw.* means Bigelow. Even the place of collecting, the collector, and the date are all too commonly lacking. "B.G." apparently means "Botanic Garden," and would certainly seem appropriate for a specimen of *Passiflora caerulea* which is so labeled. The collection likewise includes a small set of unsorted garden flowers with no data at all.

In the recent restoration we have made sure that the original labels are securely gummed to the sheets and that every scrap of the original data is preserved. We have also attached a new label bearing (1) the name of the plant as given in the 8th edition of Gray's Manual, and (2) a faithfully typed transcript of the original label. To decipher some of the faded, minuscule, and

[1] Floyd, F. G. The Rediscovery of a Historic Collection of Massachusetts Plants. Rhodora **16**: 185–187, 1914.

often wretched handwriting with the puzzling abbreviations, has required the use of a reading glass and considerable guesswork, particularly as to the proper and place names. The classification, as would be expected, is Linnaean. The numbers 6.3 on a *Lilium* label, for example, obviously means *Hexandria Trigynia.*

After working over the collection for several weeks, the junior author set himself to search for the source and early history of the plants. He has come upon data which show that it is a rather notable historical document for Massachusetts taxonomists.

The first historical reference to the "State Cabinet," of which our Herbarium was once a part, occurs on page 95 in the Report of the Secretary of Agriculture of Massachusetts for 1855, where mention is made of a room in the State House which is being prepared to accommodate it. At this time it already contained several thousand specimens, most of which were minerals. The Report for 1856 (pages 5–6) tells us that such a room has now been provided, but no appropriation has been made to furnish it. The Secretary, C. L. Flint, likewise makes appropriate recognition of the gift of various specimens of grasses during the year. So we may infer that the year 1856 marks the beginning of the botanical collection of the "Cabinet." In the 1857 Report, page 230, we are informed that: "A room has been fitted up to receive the State Cabinet, now of three to four thousand specimens of various sorts." And again the grasses are mentioned, among them "a beautiful specimen of feathergrass from Mrs. Peck of Roxbury."

In 1858, we are given a list of the minerals and birds, and in the "Appendix" the names of Dr. Edward Jarvis and Dr. Charles Pickering are mentioned as "contributing collections which were received too late to list in this Report."

The Report for 1859 is particularly important because we are there told the names of several men, some of whose contributions we have been able to identify from the labels on the sheets. This is the passage which we have already quoted and upon which Miss Day based her Item No. 126.

The Massachusetts Agricultural College was incorporated in 1863, but it was not till October 2, 1867 that the college was

formally opened to students under the presidency of the botanist-horticulturist, Col. W. S. Clark. Once more the Massachusetts Cabinet enters the picture. In the Report of the Secretary of Agriculture for 1866 we find the following record: "Resolved: that the Secretary of the Board be instructed to remove the State Cabinet to the Agricultural College, when the trustees of that Institution indicate to him their readiness to receive and care for the same."

From President Clark's Report to the Trustees for 1867 we learn that the "Cabinet" has apparently survived the journey from Boston to Amherst, and we read: "They have erected a dormitory 100 x 50 feet and four stories high, with a basement for fuel. This edifice, besides rooms for one professor and 46 students, contains two recitation rooms, a reading room and library, and two large rooms occupied by the State Cabinet of specimens illustrating the natural history and geology of Massachusetts."

A picture is given of this building which was called South Dormitory. It was burned in 1885 and on its site stands the present Administration Building.

In 1869 the college purchased the W. W. Denslow Collection of 15,000 specimens of plants, but the old State Herbarium was not incorporated in it—a fortunate circumstance since it would have been hopelessly scattered. Later references in Clark's Reports speak of the danger of destruction by fire and of the great "value of the Collection for purposes of instruction."

We may now turn our attention to the several names which appear on some of the ancient labels, or to those others which we have discovered to be in some manner intimately connected with the old Herbarium. The most important are Dr. Edward Jarvis, Dr. Charles Jarvis, Dr. Henry Little and Dr. Henry Bigelow.

Dr. Edward Jarvis, son of Francis Jarvis and Melicent (Hosmer) Jarvis, was born in Concord in 1803. He graduated from the Harvard Medical School, practiced in Northfield, Massachusetts from 1830 to 1832, resided in Concord from 1832 to 1837; practiced in Louisville, Kentucky from 1837 to 1842, and finally established residence in Dorchester from 1842 to 1884. He published a *Physiology and Hygiene* in 1846, an *Elementary*

Physiology in 1848 and a *Primary Physiology for Schools* in 1849. It is to Edward Jarvis that we must attribute many of our specimens.

Charles Jarvis was the older brother of Edward, and his "C. J." appears on some of the labels. We could discover nothing about him till we finally appealed to the Concord Librarian, Miss Sarah R. Bartlett, who kindly furnished the following information: Charles Jarvis was born in Concord on November 7, 1800. He graduated from Harvard in 1821 and took his medical degree in Boston in 1825. He settled in Bridgewater, but after practicing only three months developed malignant tumor and died in his father's home on February 23, 1826 at the age of 25. It is all but impossible to separate the contributions of the two brothers. Even those which bear the "C. J." initials may have been labeled by Edward after his brother's death. Determinative dates are rare and most of them which occur fall in the 30's. This would mean obviously that they are Edward's contributions.

The following transcripts taken at random show how nicely they correspond to the biography of the Concord Jarvises.

Tilia Glabra (*T. americana* L.), Lime Tree. Bass Wood. Northfield, Bank of Connecticut. (Dr. E. Jarvis practiced there in 1830–32).

Hibiscus Trionum (*H. Trionum* L.), Bladder Petunia. Flower-of-an-Hour. Cultivated Concord, August 1830.

Ornithogalum Umbellatum (*O. umbellatum* L.), Concord, East of Miss J. Heywood's.

Orchis Tridentata (*Habenaria clavellata* (Michx.) Spreng.), Low woods west of Cyrus Hosmer's, Concord with C. Field.

Orchis Blephariglottis (*Habenaria blephariglottis* (Willd.) Hook.) Woods west of Elijah Stevens, Concord, 30th July, 1834.

Potamogeton Natans (prob. *P. gramineus* L.), Probably a variety of the Potamogeton Natans. Found in a ditch in low ground west of Ben Hosmer's barn, near the woods—no flowers, July 30, 1834.

Medeola Virginica (*M. virginica* L.), Craigies wood, 13 June, Cambridge.

Silene Antirrhinum Ph. (*S. antirrhina* L.), Said to be used by Chimney Birds. Viscous below leaves. Hospital Yard. Sandy Soil. June 17.

Alsine media (Nutt.) (*Stellaria media* (L.) Cyrill) Chickweed, Hospital Yard, Boston, 16 June, 1824. [This must be one of Charles' specimens]

There are likewise references to Brighton Meadows; Oak Island; Chelsea; Pine Hill, Medford; Tewksbury; Cambridgeport; Lincoln, near Flint's Pond; etc.

There is a second set of specimens in the Collection whose labels are written in a minute handwriting. They sometimes carry the botanical family name in ornamental lettering and are commonly attributed to "N. H." with the date 1823. Many of them were lying loose among the unattached plants until we decided that for safety they should be gummed to the sheets. We believe that these are the "portion—collected by Dr. Henry Little of Boston, and presented to the Cabinet by Dr. Charles Pickering." Dr. Henry Little is referred to in Bigelow's *Florula Bostoniensis*, 2nd and 3rd editions, as "my pupil, H. Little." Pickering was a practicing physician in Boston who is known to have made botanical excursions in the White Mountains, possibly with William Oakes. He was chief zoologist of the U. S. Exploring Expedition to the South Seas under Lt. Charles Wilkes. Asa Gray likewise refers to these collecting trips to New Hampshire; he attributes the earlier ones to Manassah Cutler, Dr. Francis Boot and Dr. Bigelow, and says that Pickering and William Oakes are believed likewise to have collected in the White Mountains. Since Little was Bigelow's student, it is safe to attribute these plants of 1823 to one of these New Hampshire trips. The following are transcripts of a few of the Little labels:

Ledum latifolium (*L. groenlandicum* Oeder). Labrador Tea. White Hills, N. H. Aug., 1823.

Andropogon furcatus (*A. Gerardi* Vitman), Meadow, N. H. Aug. 1823.

Oxalis acetosella (*O. montana* Raf.), Woods, N. H. Woods on the W. Hills Aug., 1823.

Finally there has come to light another interesting connection with Dr. Bigelow's work. Dr. Jacob Bigelow was a physician at the Massachusetts General Hospital; he was the founder of Mt. Auburn Cemetery, the compiler of a medical botany which passed through several editions, and finally the author of *Florula Bostoniensis*, the 1st edition appearing in 1814. In 1824 he put out a 2nd and enlarged edition of the work, to cover all of New England, while a 3rd edition appeared in 1840. It was the standard New England Manual before Asa Gray's 1st edition of 1848. It is in the 2nd edition, 1824, that numerous acknowledgements are made to Messrs. B. D. Greene and Henry Little for their reports of stations where the plants occur. Some

of these plants have undoubtedly been passing through our hands this summer, as may be inferred from the following parallel quotations:

1. *Fl. Bost.* Edit. 2, 1824. Ranunculus filiformis Mx. Filiform Crowfoot. Syn. Ranunculus reptans.
   Low grounds, Topsfield, Bartlett, New Hampshire.
   Label in Old Herbarium (probably by Little):
   R. reptans.
   filiformis Mx. F. B. 224
   Topsfield, near hotel, Aug. 1823
   (Neither R. reptans nor R. filiformis appear in Bigelow's *Flor. Bost.* Edit. 1 of 1814. Little collected it in Topsfield the year before Bigelow's 2nd edition appeared. The line "filiformis Mx. F. B. 224" on Little's label has clearly been added *after the appearance of Bigelow's* 2nd edition in 1824.)
2. *Fl. Bost.* Edit. 2, 1824. Ranunculus Cymbalaria Ph. Sea Crowfoot Salt Marshes Chelsea, Cambridge
   Label in Old Herbarium. Ranunculus Cymbalaria
   Chelsea, Brighton, C. River Salt Marsh
   (Ranunculus Cymbalaria is not in *Flor. Bost.* Edit. 1.)
3. *Fl. Bost.* Edit. 2, 1824. Viola debilis Mx.
   Concord Turnpike in Cambridge
   Label in Old Herbarium. Viola Debilis. Moist woods, Concord Turnpike and also from Concord Turnpike, W. Cambridge
4. *Fl. Bost.* Edit. 2, 1824. Arbutus Uva Ursi L.
   Location, Blue Hills, Milton.
   Label in Old Herbarium. Arbutus Uva Ursi
   Blue Hills, Medford
   (There is no mention of the Blue Hills in *Flor. Bost.* Edit. 1, 1814)

In Bigelow's 2nd edition certain species are likewise included which were not mentioned in the 1st edition, and which were found by Little in 1823 though not specifically attributed to him. Such are:

1. *Fl. Bost.* Edit. 2, 1824. Ledum Latifolium—location Monadnock, White Mts.
   Little's label in Old Herbarium. Ledum latifolium, White Hills, N. H. Aug. 1823
2. *Fl. Bost.* Edit. 2, 1824. Ranunculus pennsylvanicus L.
   Little's label. Ranunculus pennsylvanicus from Greenland, N. H., 1823

Many of Bigelow's species of *Rubus* cited as coming from N. H. appear first in the 2nd edition, and our *Rubus* labels by Little carry the term "White Hills," 1823, but without specific names.

But probably the most interesting item in this connection is the following note which Bigelow includes under *Stellaria borealis:* "This plant generally occurs without petals, in which state I discovered it on the White Mt. in July, 1816. I have received it several times from the same place, but always in the apetalous state, until the last year (1823) when Messrs. Greene and Little found it there in August with complete flowers."

Bigelow himself named the plant which has now become the variable *Stellaria calycantha* (Ledeb.) Bong. There is a specimen of it in the Old Collection, and in Little's handwriting we have the words: "White Hills specimen." This doubtless makes it the "type" of the petaloid *S. calycantha.*

We have already noted that Dr. Bigelow refers to B. D. Greene, Esq. of Tewksbury in connection with Henry Little. The following labels bear the initials "B.D.G." and tell their own story:

Andromeda polifolia—Tewksbury. B.D.G.

Trifolium agrarium. B.D.G. (This is a carefully written label bearing a diagram of the flower.)

We can, therefore, infer that Dr. Jacob Bigelow availed himself generously of all these records, and the evidence is conclusive that in the old Massachusetts State Herbarium, once a part of the "Massachusetts Cabinet," we have some of the original plants which passed through his hands in preparation for the 2nd edition of his *Florula Bostoniensis* of 1824, and which were collected by Henry Little, B. D. Greene, and possibly Charles Jarvis. It is an interesting relic of the pre-Grayan systematic botany of New England.—University of Massachusetts, Amherst, Mass.

ANOTHER COASTAL PLAIN RELICT IN THE MISSOURI OZARK REGION

Julian A. Steyermark

Intensive exploration since 1936 of sink-hole ponds in the Missouri Ozarks has brought to light a startling number of plants whose main distribution is confined wholly or chiefly to the Atlantic or Gulf Coastal Plain or its counterpoart of the Mississippi Embayment extension. These ponds, located on top of the uplifted plateau-like Ozark peneplain, are scattered over the more level portions of the plateau, chiefly in the southeastern Ozark counties (See Mo. Bot. Gard. Bull. **39:** 131, 132, and map on pp. 128, 129. June, 1951). One of the species, *Scirpus etuberculatus*, which in Missouri is known only from a sink-hole pond in Oregon County, occurs elsewhere from Delaware near or along the coast to Florida and west to Louisiana. Other primarily Coastal Plain species, such as *Zizaniopsis miliacea*, *Eleocharis equisetoides*, *Scirpus Hallii*, *Echinodorus tenellus*, *Nyssa aquatica*, *Eryngium prostratum*, *Hottonia inflata*, and *Gratiola viscidula*, are isolated in and around some of these upland ponds. Some of them, such as *Eleocharis equisetoides*, *Scirpus Hallii*, *Echinodorus tenellus*, and *Gratiola viscidula*, have not been found in the Mississippi Embayment section of the lowlands of southeastern Missouri or elsewhere in the state, whereas others, such as *Zizaniopsis miliacea*, *Nyssa aquatica*, *Eryngium prostratum*, *Hottonia inflata*, *Hydrolea uniflora*, *Hedyotis Boscii*, *Cephalanthus occidentalis* var. *pubescens*, and *Pluchea foetida*, are otherwise known only from the Mississippi Embayment section of southeastern Missouri. Associated with the species of primarily southern and Coastal Plain affinities are others ranging farther northward, but in Missouri occurring only around the sink-hole ponds. Among these may be mentioned *Najas gracillima*, *Potamogeton pulcher*, *Potamogeton epihydrus* var. *Nuttallii*, *Glyceria acutiflora*, *Carex alata*, *Carex decomposita*, *Carex straminea* Willd. (not *C. straminea* sensu Mackenzie nor of Gray's Manual, 7th edition), and *Decodon verticillatus*.

Of particular phytogeographical significance, therefore, is the discovery of another typical Coastal Plain species from the vicinity of one of these sink-hole ponds. I refer here to *Eupa-*

torium hyssopifolium L., var. *calcaratum* Fern. & Schub., a collection of which I have carefully studied in comparison with other herbarium material. The range of typical *E. hyssopifolium* is given in the eighth edition of Gray's Manual as "Fla. to e. Tex., n. to s. R. I., L. I., N. J. and Md." and for var. *calcaratum* as "Dry open woods and clearings, on or near Coastal Plain, Ga. to Tex., n. to se. Mass., R. I., Ct., se. N. Y., N. J., Pa. and Md." My collections were made from dry open places bordering a sink-hole pond in southern Missouri. The surrounding upland has a more level and unbroken appearance than the more characteristic rugged and dissected topography usually associated with the Ozarks.

Like *Scirpus etuberculatus*, this interior Ozark station for *Eupatorium hyssopifolium* var. *calcaratum* is isolated by a thousand miles or more from its nearest Coastal Plain habitat. Species with which *Eupatorium hyssopifolium* var. *calcaratum* was associated are *Ilex decidua*, *Eryngium prostratum*. *Diodia virginiana*, and *Pluchea foetida*, whose distributions are mainly found in the Gulf and Atlantic Coastal Plain areas and the Mississippi Embayment section.

Specimens of the collection have been deposited in the Chicago Natural History Museum Herbarium, Gray Herbarium, and Missouri Botanical Garden Herbarium. The data for the collection of *Eupatorium hyssopifolium* var. *calcaratum* in Missouri is, dry open places bordering Twin Ponds, east of highway A, T 23 N, R 8 W, NW ¼ sect. 16, in dry upland, 4 miles south of West Plains, Howell County, September 3, 1949, *Steyermark 69063*.

The occurrence of this isolated Coastal Plain plant in the dry interior of the Ozark highlands is comparable to the occurrence of some of the stranded Coastal Plain relicts found on the Cumberland Plateau and elsewhere in the eastern United States. Present studies based upon the author's explorations of numerous sink-hole ponds during the past decade and a half indicate that the Missouri sink-hole ponds represent the last remnants of parts of the swampy peneplain that formerly existed in the state prior to the last uplift of this peneplain area at the end of the Tertiary Period. The drainage of these ponds is connected with that of underground streams flowing eventually southeastward into the Mississippi River or Mississippi Embayment, or southward into

the White River drainage, the latter eventually connecting with the drainage of the Mississippi River. As the Tertiary uplift of the Ozark region gradually changed the peneplain from a region of sluggish streams and swampy habitats to the present upland topography with its rocky drier soils and dissected well-drained topography, the formerly more abundant aquatic and sub-aquatic habitats of the swampy peneplain became more drained and eventually were reduced to a relatively few localities centering around the present sink-hole ponds. After Pleistocene times the Xerothermic period must have further reduced the occurrence of strictly aquatic habitats, exterminating Coastal Plain and other species that had survived from the end of the Tertiary uplift.

These sink-hole ponds give every evidence of having served for aquatic habitats in the past and at present they afford a refuge in the Ozarks by being the last remaining habitats suitable for Coastal Plain and Mississippi Embayment species. Botanically, therefore, they represent probably the most significant relict habitat in the Ozarks, dating back to the close of the Tertiary Period, and the species isolated in their distribution to these ponds are in Missouri certainly to be considered as among the oldest, if not the oldest, elements in the flora of the state.—Chicago Natural History Museum and Missouri Botanical Garden.

ADDITIONS AND EXTENSIONS TO THE FLORA OF NOVA SCOTIA

J. S. Erskine

The following records of collections were made, chiefly during 1950–51, while collecting for the Nova Scotia Museum of Science. To avoid repetition, new records for Cape Breton were included in the recent paper by Dr. E. C. Smith (Rhodora **54**: 220. 1952).

Lycopodium Selago L. Amethyst Cove, King's County. First record for mainland.

Sparganium hyperboreum Laest. New Harbour, Guysborough County. First record for mainland.

Bromus Tectorum L. Common on railway ballast around the railway station at Berwick, King's County. Confirmed by W. G. Dore of the Dominion Experimental Farm, Ottawa who

says: "This approaches var. *glabratus* Spenner in its glabrous glumes and scabrous lemmas. The weed that is common in southern Ontario and southern Alberta is quite hispid to pilose on the spikelets. It would appear that your collection, which is the first I know of from Nova Scotia, has been an introduction from a source not in the interior of Canada. Our two collections from New Brunswick (St. Andrews 1936 and Fredericton 1934) are both of the typical hairy kind."

Eragrostis poaeoides Beauv. This was found growing on railway ballast at Truro, Colchester County, *E. C. Smith et al. 4809*, and at Wolfville, King's County, *D. S. and J. S. Erskine JSE 51.1532*. It was determined by W. G. Dore.

Panicum clandestinum L. Gaspereau River, King's County; Shubenacadie River, Halifax County; St. Mary's River, Guysborough County. Eastward extension of range.

Rhynchospora capitellata (Michx.) Vahl. Abundant in flood-plain of St. Mary's River at Caledonia, Guysborough County. Extension from southwest corner of province.

Stellaria Holostea L. Reported in error (Rhodora **53**: 268. 1951) by D. S. Erskine from a record of mine.

Sanguisorba officinalis L. A long-established but not large station of this plant was found between a meadow and an oxbow pond beside the St. Mary's River, some four miles above Sherbrooke, Guysborough County (*JSE 51.570*). This seems to be the first record for Canada.

Dirca palustris L. A single sterile bush of this species was found on the Newport "chimneys," a network of gypsum sinkholes shaded by spruce beside the St. Croix River, Hants County. No material for comparison was locally available, however D. S. Erskine, after looking up material of this species in the University of Toronto herbarium, thought our collection was accurately determined. Since then W. B. Schofield has found in some unpublished material of Macoun's in the National Museum at Ottawa a report of the finding by Dr. Soloan and his students of three stations of this plant in Nova Scotia. This was unsupported by collections and the definition of locality was vague, e. g. "Wentworth." There is a "Wentworth" within three miles of our new station for *Dirca*, but there are also others in the province.

Epilobium angustifolium L., f. albiflorum (Dumont) Haussk. One white flowered plant among typical, *R. Erskine*, Sandy Cove, Digby County, 9th August 1948.

Asclepias incarnata L., var. neoscotica Fern. Headwaters of Gay River, Halifax County; Whycocomagh and Black River, Inverness County. The three varieties of the species, *neoscotica*, *typica* and *pulchra*, are all found here and do not separate satisfactorily. Each colony found seemed to have minor differences nearly as important as those of number and size and pilosity of leaves. The station at Gay River was sterile or in flower; that at Whycocomagh two days later was wholly in fruit or sterile; those at Black River three days after that were sterile or in flower, but the most typically *neoscotica* were usually browsed off while the clumps protected by banks of *Crataegus* were tall and approached var. *pulchra*. It would be interesting to have an experimental taxonomist subject these varieties to poor soil and periodic browsing in order to determine to what extent these differences are environmental.

Gratiola aurea Muhl. Lake Charlotte, Halifax County; Gaspereau Lake, King's County. Minor extensions.

Campanula aparinoides Pursh. Near mouth of Economy River, Colchester County (*JSE 51.145*). Second station for province.

Eupatorium maculatum L., f. Faxoni Fern. Two plants in marsh at Whycocomagh, Inverness County (*JSE 51.822*).

Solidago flexicaulis × macrophylla. *S. macrophylla* Pursh is common in Cape Breton but is rare on the mainland. Two collections have been made in Colchester County from the Economy River valley (*E. C. Smith et al. 1208; JSE 51.163*). The author found a single flowering plant at Amethyst Cove, King's County, (*JSE 51.1652*), growing among abundant *S. flexicaulis* L., while another single plant (*JSE 51.1654*) combined the characters of both species, having the size and long-branched inflorescence of *macrophylla*, the shorter petioles and less coarse serration of leaf and small heads of *flexicaulis*. As Gray's Manual does not include this among *Solidago* hybrids observed, it may be worthy of note.

Crepis capillaris (L.) Wallr. Well-established in a pasture half a mile northeast of the much collected Villagedale Dunes, Shelburne County (*JSE 51.1467*). New to the province.

Grateful acknowledgements are due to the Nova Scotia Museum of Science for financing the collecting and to Dr. W. G. Dore and Dr. B. Boivin of the Dominion Experimental Farm, Ottawa, for determinations of plants new to the province.
Wolfville, Nova Scotia.

Podophyllum peltatum forma Deamii Raymond in Western Pennsylvania.—These plants grow in open white-oak woods with an understory of sassafras and flowering dogwood, near Criders Corners in Butler County, just across the Allegheny County line. They occur in a large patch which is twelve feet in the longest dimension and contains fifty or more plants, all of which have the maroon colored (dark vinaceous of Ridgway) fruits and blush-pink blossoms. Nearby and scattered throughout the woods are many other patches, all of which are the ordinary yellow-fruited kind.

This patch was first discovered on June 27, 1943, by A. J. Deer, W. E. Buker, and F. H. Beer, at which time a specimen was taken and presented to the Carnegie Museum Herbarium. The specimen was filed as a color variant of *P. peltatum.* When Dr. Raymond's form was described in 1948, we found that our specimen checked exactly with his description of forma *Deamii.* The form was included in the "Check List of the Vascular Flora of Allegheny County, Pennsylvania," published by the author and Mr. Buker in 1951, since we also listed species not yet found within the County but collected within a ten-mile radius of the boundary.

On June 5, 1952, Mr. Buker and the author visited the patch again in order to collect some specimens for exchange. It seems likely that all the plants have been derived from a single mutant parent by rhizomatous growth, since digging revealed that several plants were connected to one rhizome. The coloring of the plants and the immature fruits was as follows: tip of rhizome bud, dark vinaceous (Ridgway); base of stem, dark vinaceous; remainder of stem and the petioles, flecked with same color; peduncles maroon (Ridgway); and immature fruits dark vinaceous.—L. K. Henry, Curator of Plants, Carnegie Museum, Pittsburgh.

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65. Weatherby, C. A. I. The Group of Polypodium lanceolatum in North America. Macbride, J. Francis. II. Notes on certain Leguminosae of the Tribe Psoraleae. Robinson, B. L. III. Dyscritothamnus, a New Genus of Compositae. With 1 plate. Macbride, J. Francis. IV. A Revision of the Rocky Mountain Astragali of Subgenus Homalobus. V. Various North American Spermatophytes, new or transferred. Robinson, B. L. VI. Records preliminary to a general Treatment of the Eupatorieae, —II. (Published by the Gray Herbarium. 1–54 pp. 1922.) .40

66. Fernald, M. L. Polypodium virginianum and P. vulgare. (Reprinted from Rhodora, XXIV. 125–142. 1922.) .35

*67. Fernald, M. L. Notes on the Flora of Western Nova Scotia, 1921. (Reprinted from Rhodora, XXIV. 32 pp. 1922.) .40

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